

**Magnetic Merging locations Deduced from: Slow-Mode Shock Orientation Determinations, Boundary Layer Wave Intensities and Energetic Ion Velocity Dispersion in the Distant Geomagnetic Tail**

C. M. Ho, B. T. Tsurutani and E. J. Smith and N. Murphy (all at Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109)

Several techniques will used to determine the location of the magnetic reconnection in distant geomagnetic tail using ISEE-3 measurements. Calculated wave-particle scattering time, based on measured wave amplitudes, gives a time for isotropization and disruption of an ion beam. Assuming all particle energies are created at the same time and place, energetic ion velocity dispersion (particle flight time) gives an independent estimate. If we also detect a plasmoid (or TCR) within the same event, we may calculate the plasmoid source location based on measured plasma bulk velocity, by assuming the plasmoid has the same source as ions from the magnetic merging region. Through an analysis of the magnetic field geometry and slow-mode shock orientation, we can make a third determination of the location of the reconnect ion site. We also examine the magnetic field  $B_z$  components and plasma bulk speeds in the plasmashet associated with slow-mode shocks to determine which side of the magnetic merging regions ISEE-3 is located at. These various techniques will be applied to determine the X-line distance from earth and the results of the various methods will be intercompared with each other. We also will investigate substorm dependence of these magnetic merging events in the distant tail.

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3. (a) C. M. Ho  
JPL/NASA  
MS 169-506  
4800 Oak Grove Dr.  
Pasadena, CA 91109-8099  
(b) Tel: 1-818-354-7894  
(c) Fax: 1-818-354-8895  
(d) E-Mail:  
cho@jplsp.jpl.nasa.gov
4. IAGA
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